barium; "A" is copper, bismuth, titanium, tungsten, zirconium, tantalum, niobium, vanadium or a combination thereof; "x" is from about 0.01 to about 1.0; "a" is 1 to 2; "b" is 1; and "y" is about 2 to about 4;

cooling said metal oxide complex to a temperature at or below that at which said metal oxide complex becomes superconductive; and

initiating a flow of electrical current within said metal oxide complex while maintaining said metal oxide complex at or below the temperature at which it becomes superconductive.

17. The method of claim 16, wherein "L" is yttirum, lanthanum, lutetium or a combination thereof; "M" is barium, strontium, calcium, magnesium or a combination thereof; and "x" is from about 0.075 to about 0.5.

18. The method of claim 16, wherein "L" is lanthanum, "M" is strontium, "A" is copper, "x" is from about 0.075 to about 0.185 and "a" is 2.

19. The method of claim 16, wherein "M" is barium or strontium and "A" is copper.

20. A method for conducting an electrical current within a conductor material without electrical resistive losses, comprising the steps of:

utilizing as the conductor material a metal oxide complex of the formula

$$[L_{1-x}M_x]_aA_bO_y$$

wherein "L" is scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, or a combination thereof; "M" is barium,

strontium, calcium, magnesium, mercury, or a combination thereof ; "A" is copper, bismuth, titanium, tungsten, zirconium, tantalum, niobium, vanadium, or a combination thereof; "x" is from about 0.65 to about 0.80; "a" is 1; "b" is 1; and "y" is about 2 to about 4;

cooling said metal oxide complex to a temperature at or below that at which said metal oxide complex becomes superconductive; and

initiating a flow of electrical current within said metal oxide complex while maintaining said metal oxide complex at or below the temperature at which it becomes superconductive.

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Sub C3

21. The method of claim 20 wherein "M" is barium or strontium, and "A" is copper.

22. The method of claim 21, wherein "M" is barium and "x" is about 0.667.

23. The method of claim 22, wherein "L" is yttrium, lanthanum neodymium, samarium, europium, gadolinium, erbium or lutetium.

24. The method of claim 20, wherein the oxide complex has the formula

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$$LM_2A_3O_{6+\partial}$$

and ∂ has a number value from about 0.1 to about 4.5.

25. The method of claim 24, wherein "L" is yttrium, lanthanum, neodymium, samarium, europium, gadolinium, erbium or lutetium, "M"is barium or strontium, "A" is copper.

26. The method of claim 25, wherein ∂ has a number value from about 0.1 to about 1.0.

Sub C5

27. The method of claim 26, wherein ∂ has a number of from about 0.1 to about 0.5.

28. The method of claim 20, wherein "L" is yttrium, lanthanum or lutetium and "M" is barium.

29. A method for conducting an electrical current within a conductor material without electrical resistive losses, comprising the steps of:

utilizing as the conductor material a metal oxide complex of the formula

$$[L_{1-x}M_x]_aA_bO_y$$

wherein "L" is yttrium, lanthanum, lutetium, or a combination thereof; "M" is barium, strontium, calcium, magnesium, or a combination thereof; "A" is copper, bismuth, titanium, tungsten, zirconium, tantalum, niobium, vanadium or a combination thereof; "x" is from about 0.01 to about 0.03; "a" is 1 to 2; "b" is 1; and "y" is about 2 to about 4;

cooling said metal oxide complex to a temperature at or below that at which said metal oxide complex becomes superconductive; and

initiating a flow of electrical current within said metal oxide complex while maintaining said metal oxide complex at or below the temperature at which it becomes superconductive.

30. The method of claim 29, wherein "M" is substantially free of barium.

31. The method of claim 29, wherein "L" is lanthanum and "A" is copper.

32. The method of claim 29, wherein "M" is barium.

33. The method of claim 29, wherein "M" is strontium.

34. The method of claim 29, wherein "M" is a combination of two or more of barium, strontium, calcium and magnesium.

35. A composition which is superconducting at or above 40°K, comprising:

a sintered metal oxide complex of the formula

$$[L_{1-x}M_x]_aA_bO_y$$

wherein element "L" is lanthanum, yttrium, lutetium or mixtures thereof; element "M" is barium, strontium, calcium, magnesium or mixtures thererof; element "A" is copper, bismuth, tungsten, zirconium, tantalum, niobium, vanadium or mixtures thereof; "x" is a number in the range of about 0.075 to about 0.5; "a" is a number in the range of 1 and 2; "b" is 1; "y" is from about 2 to about 4; and

wherein the interatomic distances between the element of said metal oxide complex are reduced compared to the interatomic distances between the elements of an oxide complex under atmospheric pressure comprising

$$[La_{1-x}Ba_x]_aCuO_y.$$

36. The superconducting composition of claim 35, wherein "L" is lanthanum, "M" is strontium, "A" is copper and "x" is a number of from about 0.075 to about 0.185.

37. The superconducting composition of claim 36, wherein "a" is 2.

38. The superconducting composition of claim 35, wherein "L" is lanthanum, "M" is barium, "A" is copper, "x" is from about 0.075 to about 0.2, and "a" is 2.

39. The superconducting composition of claim 35, wherein "L" is lanthanum, "M" is barium, "A" is copper, "x" is from about 0.3 to about 0.4, and "a" is 1.

40. The superconducting composition of claim 35, wherein the interatomic distances between the elements of the oxide complex are reduced by utilizing as the element "M" strontium, calcium, magnesium or a combination thereof.

41. The superconducting composition of claim 40, wherein the element "M" is strontium.

B3 cont'd

42. The superconducting composition of claim 41, wherein "A" is copper.

43. The superconducting composition of claim 35, wherein the interatomic distances between the elements of the oxide complex are reduced by utilizing as the element "L" yttrium, lutetium or a combination thereof.

44. The superconducting composition of claim 43, wherein the element "L" is yttrium.

45. The superconducting composition of claim 44, wherein "A" is copper.

46. The superconducting composition of claim 43, wherein "M" is barium or strontium and "A" is copper.

47. A composition which is superconductive at a temperature of 40°K and higher, comprising:

a sintered metal oxide complex of the formula

$$[L_{1-x}M_x]_aA_bO_y$$

wherein;

"L" is yttrium, lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, or

lutetium, or a combination thereof; "M" is barium, strontium, calcium, magnesium, mercury, or a combination thereof provided that when "L" is lanthanum "M" is not barium; "A" is copper, bismuth, tungsten, tantalum, niobium, vanadium; "x" is from about 0.01 to 1.0; "a" is 1 to 2; "b" is 1; and "y" is about 2 to about 4.

48. The superconducting composition of claim 47, wherein "M" is barium or strontium, "A" is copper, "a" is 1, and "x" is from about 0.65 to about 0.80.

49. The superconducting composition of claim 48, wherein "x" is about 0.667.

50. The superconducting composition of claim 47, wherein "L" is yttrium, lanthanum, lutetium or a combination thereof; "M" is barium, strontium, calcium, magnesium or a combination thereof; and "x" is from about 0.01 to about 0.5.

51. The superconducting composition of claim 50, wherein "x" is about 0.01 to about 0.03.

52. The superconducting composition of claim 51, wherein "M" is barium or strontium and "A" is copper.

53. The superconducting composition of claim 50, wherein "x" is from about 0.075 to about 0.5.

54. The superconducting composition of claim 53, wherein "L" is lanthanum, "M" is strontium, "A" is copper, and "x" is from about 0.075 to about 0.185.

55. The superconducting composition of claim 54, wherein "a" is 2.

56. A composition which is superconductive at a temperature of 40°K and higher, comprising:

a sintered metal oxide complex of the formula

$$[L_{1-x}M_x]_aA_bO_y$$

wherein;

"L" is scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dyprosium, holmium, erbium, thulium, ytterbium, or lutetium, or a combination thereof; "M" is barium, strontium, calcium, magnesium, mercury, or a combination thereof; "A" is copper, bismuth, tungsten, zirconium, tantalum, niobium, vanadium; "x" is from about 0.65 to 0.80; "a" is 1; "b" is 1; and "y" is about 2 to about 4.

57. The superconducting composition of claim 56, wherein "M" is barium or strontium and "A" is copper.

58. The superconducting composition of claim 57, wherein "x" is about 0.667.

59. The superconducting composition of claim 58, wherein "M" is barium.

60. The superconducting composition of claim 59, wherein "L" is yttrium, lanthanum neodymium, samarium, europium, gadolinium, erbium or lutetium.

61. The superconducting composition of claim 56, wherein the oxide complex has the formula

$$LM_2A_3O_{6+\partial}$$

and ∂ has a number value from about 0.1 to about 4.5.

62. The superconducting composition of claim 61, wherein "M" is barium or strontium, "A" is copper.

63. The superconducting composition of claim 62, wherein ∂ has a number value from about 0.1 to about 1.0.

64. The superconducting composition of claim 63, wherein ∂ has a number value of from about 0.1 to about 0.5.

65. The superconducting composition of claim 64, wherein "L" is yttrium, lanthanum neodymium, somarium, europium, gadolinium, erbium or lutetium and "M" is barium.

66. A superconducting metal oxide complex having the formula $(L_{1-x}M_x)_aA_bO_y$, wherein "L" is lanthanum, lutetium, yttrium or a combination thereof; "M" is barium, strontium, calcium, magnesium or a combination thereof provided that when "L" is lanthanum "M" is not barium; "A" is copper bismuth, tungsten, zirconium, tantalum, niobium, vanadium or a combination thereof; "a" is 1 to 2; "b" is 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to about 4; said complex made by a process comprising the steps of:

B5 Cont'd

heating a mixture of solid compounds containing L, M, A and O in proportions appropriate to yield said formula to a temperature of 640-800°C in an oxygen atmosphere and for a time sufficient to react the mixture in the solid state and then heating the mixture at 900-1100°C for a period of at least about 12 hours subsequent to said reaction;

pelletizing the mixture; and

sintering the pellets.

Sub C12

67. The complex of claim 66, wherein said process further comprises homogenizing the mixture subsequent to said reaction and heating.

68. The complex of claim 67, wherein said process further comprises heating said homogenized mixture at 900-1100°C for at least about 6 hours.

69. The complex of claim 66, wherein the mixture is pelletized by compressing the mixture with a pressure of at least 1 kilobar.

70. The complex of claim 66, wherein said sintering is at a temperature of 900-1100°C.

71. The complex of claim 66, wherein said process further comprises quenching the sintered pellets.

72. The complex of claim 66, wherein "A" is copper.

73. The complex of claim 72, wherein "M" is barium.

B5 cont'd

74. The complex of claim 72, wherein "M" is strontium.

75. The complex of claim 66, wherein "M" is strontium, calcium, or magnesium and essentially free of barium.

76. The complex of claim 66, wherein "x" is about 0.01 to about 0.03.

77. The complex of claim 66, wherein "x" is about 0.075 to about 0.5.

78. A superconducting metal oxide complex having the formula $(L_{1-x}M_x)_aA_bO_y$, wherein "L" is lanthanum, lutetium, yttrium, scandium or a combination thereof; "M" is barium, strontium, calcium, magnesium, mercury or a combination thereof; "A" is copper, bismuth, titanium, tungsten, zirconium, tantalum, niobium, vanadium or a combination thereof; "a" is 1 to 2; "b" is 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to about 4; said complex made by a process comprising the steps of:

mixing solid compounds containing L, M, A and O in amounts appropriate to yield said formula;

compacting the mixture into a solid mass by application of pressure from about 100 to about 30,000 psi;

heating the solid mass in air to a temperature of from about 900 to about 1100°C for at least about 5 minutes; and

quenching the solid mass to ambient temperature in air.

79. The complex of claim 78, wherein "M" is barium and "A" is copper.

80. The complex of claim 79, wherein the mixture is compacted to a solid mass by application of pressure of from about 100 to about 500 psi.

81. The complex of claim 80, wherein the solid mass is heated for a period of from about 5 to about 15 minutes.

82. A superconducting metal oxide complex having the formula $(L_{1-x}M_x)_aA_bO_y$, wherein "L" is scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, samarium, eruopium, gadolinium, terbium, dyprosium, holmium, erbium, thulium, ytterbium, or lutetium, or a combination thereof; "M" is barium, strontium, calcium, magnesium, mercury, or a combination thereof; "A" is copper bismuth, titanium, tungsten, zirconium, tantalum, niobium, vanadium or a combination thereof; "a" is 1 to 2; "b" is 1; "x" is from about 0.01 to 1.0; and "y" is about 2 to about 4; said complex made by a process comprising the steps of:

compressing a mixture of solid powdered compounds containing L, M, A and O in proportions appropriate to yield said formula;

heating the compressed powder mixture to a temperature of from about 800°C to about 1000°C for a time sufficient to react the compressed mixture in the solid state; and

quenching said reacted compressed mixture to ambient temperature.

B5 cont'd Sub C14

83. The oxide complex of claim 82, wherein "M" is barium or strontium, "A" is copper, "a" is 1 and "x" is from about 0.65 to about 0.80.

84. The oxide complex of claim 83, wherein the solid compounds containing L are L_2O_3, the solid compounds containing "M" are MCO_3 and the solid compounds containing A are AO.

85. The oxide complex of claim 84, wherein "M" is barium and "x" is about 0.667.

86. The oxide complex of claim 85, wherein the compressed powder mixture is heated under a reduced oxygen atmosphere of about 2000μ at a temperature of from about 820°C to about 950°C.

87. The oxide complex of claim 86, wherein "L" is yttrium, lanthanum neodymium, samarium, europium, gadolinium, erbium or lutetium, "M" is barium and "A" is copper.

88. A method for making a superconducting metal oxide complex, comprising the steps of:

mixing solid compounds containing L, M, A and O in amounts appropriate to yield the formula $(L_{1-x}M_x)_aA_bO_y$,

wherein "L" is scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, halmium, erbium, thulium, ytterbium, lutetium, or a combination thereof; "M" is barium, strontium, calcium, magnesium, mercury or a combination thereof; "A" is copper, bismuth, titanium, tungsten, zirconium, tantalum, niobium, vanadium or a combination thereof; "a" is 1 to 2; "b" is 1; "x" is about 0.01 to about 1.0; and "y" is about 2 to about 4;

compacting the mixture into a solid mass by application of pressure from about 100 to about 30,000 psi;

heating the solid mass in air to a temperature of from about 800 to about 1000°C for a time sufficient to react the compacted mixture in the solid state; and

quenching the solid mass to ambient temperature in air.

89. The method of claim 88, wherein "M" is barium or strontium and "A" is copper.

90. The method of claim 89, wherein "x" is about 0.65 to about 0.80 and "a" is 1.

91. The method of claim 90, wherein the mixture is compacted to a solid mass by application of pressure of from about 100 to about 500 psi.

92. The method of claim 91, wherein the solid mass is heated under a reduced oxygen atmosphere of about 2000μ at a temperature of from about 820°C to about 950°C.

REMARKS

The amendments to the specification are to insert a statement relating to Government support and to correct